CLAIMS

1. In a multiple-access OFDM-CDMA system, a method for processing data for transmission over a wireless communication channel, comprising:

coding a data stream in accordance with a particular coding scheme to provide a stream of data symbols;

spreading the data symbol stream in a frequency domain with one or more spreading codes to provide spread data, wherein the one or more spreading codes are selected from a set of available spreading codes and assigned to the data stream;

transforming the spread data in accordance with a particular transformation to provide a stream of OFDM symbols;

scaling the stream of OFDM symbols in accordance with a particular gain selected for the data stream; and

transmitting the scaled OFDM symbols over the communication channel.

2. The method of claim 1, further comprising:

appending a cyclic prefix to each OFDM symbol to provide a corresponding transmission symbol, wherein transmission symbols are scaled and transmitted over the communication channel.

3. The method of claim 1, further comprising:

covering the scaled OFDM symbols with a cover code.

4. The method of claim 3, wherein the cover code has a length that is multiple integer times a length of the OFDM symbol.

5. The method of claim 3, wherein the cover code has a length that is multiple integer times a length of a transmission symbol formed by appending a cyclic prefix to an OFDM symbol.

6. The method of claim 1, wherein the data symbol stream comprises coded bits.

7. The method of claim 1, wherein the data symbol stream comprises modulation symbols derived based on a particular modulation scheme.

8. The method of claim 1, further comprising:

transmitting a pilot along with the scaled OFDM symbols over the communication channel.

9. The method of claim 1, wherein the spreading codes are Walsh codes.

10. The method of claim 1, wherein the spreading codes are orthogonal codes.

11. The method of claim 1, wherein the spreading codes are pseudo-orthogonal codes.

12. The method of claim 1, wherein the transformation is an inverse Fourier transform.

13. The method of claim 9, wherein the Walsh codes have a length equal to the dimension of the transformation.

14. The method of claim 1, further comprising:

adjusting the spreading based on a data rate of the data stream.

15. The method of claim 14, wherein the spreading is adjusted by assigning a plurality of spreading codes to the data stream.

16. The method of claim 14, wherein the spreading is adjusted by assigning one or more spreading codes of shorter length to the data stream.

17. The method of claim 14, wherein the spreading is effectively not performed when the data rate of the data stream reaches a particular threshold data rate.

18. The method of claim 14, further comprising:

scaling transmit power for the data stream based on the data rate.

19. The method of claim 1, further comprising:

adjusting the gain to adjust transmit power for the data stream.

20. The method of claim 1, wherein the scaled OFDM symbols are transmitted on a downlink from a base station to a terminal.

21. The method of claim 1, wherein the scaled OFDM symbols are transmitted on an uplink from a terminal to a base station.

22. In a multiple-access OFDM-CDMA system, a method for processing data for transmission over a wireless communication channel, comprising:

coding a data stream in accordance with a particular coding scheme to provide a stream of data symbols;

spreading the data symbol stream in a frequency domain with one or more spreading codes to provide spread data, wherein the one or more spreading codes are selected from a set of available spreading codes and assigned to the data stream;

transforming the spread data in accordance with an inverse Fourier transform to provide a stream of OFDM symbols;

appending a cyclic prefix to each OFDM symbol to provide a corresponding transmission symbol;

scaling each transmission symbol in accordance with a particular gain selected for the data stream;

covering scaled transmission symbols with a cover code; and

transmitting the scaled transmission symbols over the communication channel.

23. In a multiple-access OFDM-CDMA system, a method for recovering data transmitted over a wireless communication channel, comprising:

processing a received signal to provide data samples;

transforming the data samples in accordance with a particular transformation to provide transformed samples;

despreading the transformed samples with one or more sets of despreading coefficients to provide despread samples, wherein each set of despreading coefficients is

associated with a respective despreading code that corresponds to a spreading code used to spread data prior to transmission and selected from a set of available spreading codes;

combining the despread samples for each time interval to provide a demodulated symbol representative of a transmitted OFDM symbol; and

decoding demodulated symbols to provide decoded data.

24. The method of claim 23, further comprising:

decovering the data samples with a cover code to provide decovered samples, wherein the transforming is performed on the decovered samples.

25. The method of claim 23, further comprising:

discarding data samples corresponding to a cyclic prefix appended to each OFDM symbol.

26. The method of claim 23, wherein the transformation is a Fourier transform.

27. The method of claim 23, further comprising:

combining demodulated symbols derived from a plurality of received signals to provide combined demodulated symbols.

28. The method of claim 27, wherein the plurality of received signals are transmitted from a plurality of cells or sectors in the system.

29. The method of claim 23, further comprising:

estimating a response for the communication channel, and

wherein each set of despreading coefficients is derived based in part on a set of weights indicative of the estimated channel response.

30. The method of claim 29, wherein the channel response is estimated based on a pilot included in the received signal.

31. The method of claim 23, further comprising:

estimating a quality of the received signal; and

transmitting power control commands derived based on the estimated received signal quality.

32. The method of claim 31, wherein the received signal quality is estimated based on the demodulated symbols.

33. The method of claim 31, wherein the received signal quality is estimated based on a pilot included in the received signal.

34. In a multiple-access OFDM-CDMA system, a method for recovering data transmitted over a wireless communication channel, comprising:

processing a received signal to provide data samples;

decovering the data samples with a cover code to provide decovered samples;

transforming the decovered samples in accordance with a Fourier transform to provide transformed samples;

despreading the transformed samples with one or more sets of despreading coefficients to provide despread samples, wherein each set of despreading coefficients is associated with a respective despreading code that corresponds to a spreading code used to spread data prior to transmission and selected from a set of available spreading codes;

combining the despread samples for each time interval to provide a demodulated symbol representative of a transmitted OFDM symbol; and

decoding demodulated symbols to provide decoded data.

35. A transmitter unit in a multiple-access OFDM-CDMA system, comprising:

a TX data processor operative to code a data stream in accordance with a particular coding scheme to provide a stream of data symbols;

a frequency-domain spreader operative to receive and spread the data symbol stream in a frequency domain with one or more spreading codes to provide spread data, wherein the one or more spreading codes are selected from a set of available spreading codes and assigned to the data stream;

a transformer operative to transform the spread data in accordance with a particular transformation to provide a stream of OFDM symbols;

a first multiplier operative to scale the stream of OFDM symbols in accordance with a particular gain selected for the data stream; and

a transmitter operative to process the scaled OFDM symbols to provide a modulated signal and to transmit the modulated signal over the communication channel.

36. The transmitter unit of claim 35, further comprising:

a cyclic prefix insertion element operative to repeat a portion of each OFDM symbol to provide a corresponding transmission symbol.

37. The transmitter unit of claim 35, further comprising:

a second multiplier operative to cover the scaled OFDM symbols with a cover code.

38. A base station comprising the transmitter unit of claim 35.

39. A terminal comprising the transmitter unit of claim 35.

40. A transmitter apparatus in a multiple-access OFDM-CDMA system, comprising:

means for coding a data stream in accordance with a particular coding scheme to provide a stream of data symbols;

means for spreading the data symbol stream in a frequency domain with one or more spreading codes to provide spread data, wherein the one or more spreading codes are selected from a set of available spreading codes and assigned to the data stream;

means for transforming the spread data in accordance with a particular transformation to provide a stream of OFDM symbols;

means for scaling the stream of OFDM symbols in accordance with a particular gain selected for the data stream;

means for processing the scaled OFDM symbols to provide a modulated signal; and

means for transmitting the modulated signal over the communication channel.

41. A receiver unit in a multiple-access OFDM-CDMA system, comprising:

a receiver operative to process a received signal to provide data samples;

a transformer operative to transform the data samples in accordance with a particular transformation to provide transformed samples;

a despreader operative to despread the transformed samples with one or more sets of despreading coefficients to provide despread samples, wherein each set of despreading coefficients is associated with a respective despreading code that corresponds to a spreading code used to spread data prior to transmission and selected from a set of available spreading codes;

a first summer operative to combine the despread samples for each time interval to provide a demodulated symbol representative of a transmitted OFDM symbol; and

a RX data processor operative to decode demodulated symbols to provide decoded data.

42. The receiver unit of claim 41, further comprising:

a buffer operative to discard data samples corresponding to a cyclic prefix appended to each OFDM symbol.

43. The receiver unit of claim 41, further comprising:

a multiplier operative to decover the data samples with a cover code to provide decovered samples, wherein the transformer is operative to transform the decovered samples.

44. The receiver unit of claim 41, further comprising:

a second summer operative to combine demodulated symbols derived from a plurality of received signals to provide combined demodulated symbols.

45. The receiver unit of claim 44, wherein the plurality of received signals are from a plurality of cells or sectors in the system.

46. A base station comprising the receiver unit of claim 41.

47. A terminal comprising the receiver unit of claim 41.

48. A receiver apparatus in a multiple-access OFDM-CDMA system, comprising:

means for processing a received signal to provide data samples;

means for transforming the data samples in accordance with a particular transformation to provide transformed samples;

means for despreading the transformed samples with one or more sets of despreading coefficients to provide despread samples, wherein each set of despreading coefficients is associated with a respective despreading code that corresponds to a spreading code used to spread data prior to transmission and selected from a set of available spreading codes;

means for combining the despread samples for each time interval to provide a demodulated symbol representative of a transmitted OFDM symbol; and

means for decoding demodulated symbols to provide decoded data.